

Case No. F3238(C)

**REMARKS**

Reconsideration of the application, as amended, is respectfully requested.

A full copy of WO 97/26800 is enclosed, together with an additional form PTO 1449.

A copy of the drawing is submitted showing proposed changes in red ink.

The specification has been amended in accordance with the suggestions of the Office.

Claim 2 has been merged with claim 1 to form new claim 20; "preferably" has been removed.

Claim 9 has been merged with claim 8 to form new claim 21; "preferably" has been removed.

New claims 22 and 23 are recited which are similar to claims 20 and 21 except that the phrase "cooling means" is omitted.

Claims 20-23 use a definition of the parameters which complies with the definition which is generally recognized in technical literature on extrusion (Engineering principles of plasticating extrusion - as already cited in the instant application). It is thus submitted that the instant claims are clear with respect to the definitions of thread starts and pitch angle. It is particularly submitted that the pitch angle is recited to be between 32 and 42 degrees; this governs the shear of the product in the extruder. There is no requirement that it be constant. Therefore, it is for example possible to have a constant diameter and a varying pitch length.

Case No. F3238(C)

Turning to H/Wc, again Applicants respectfully disagree with the Office's argument. What is recited is a certain H/Wc ratio. There are many ways to achieve this. Operating with constant H and Wc is only one of them.

The present claims recite, among other things, a single screw extruder with cooling means and/or a cooling circuit. '209 discloses twin screw extruders and the Office points to no teaching of the presently recited single screw extruder. Therefore, '209 lacks a significant feature of the invention.

Moreover, the Office appears to use an analysis based on hindsight gained from the present application. By relying on a most preferred aspect of an embodiment (ratio of flight crest radius to flight root radius of 1.04) and an extreme hypothetical embodiment (a screw having a pitch equal to 2.4 times the diameter) it arrives at a pitch angle of over 32 degrees.

The Office points to no reason why one of ordinary skill, even if twin screw extruders were relevant, would choose the hypothesis elected by the Office namely;

- . most preferred crest to root ratio
- . extreme range of pitch to diameter ratio.

It is therefore submitted that, contrary to what the Office is stating, '209 does not teach a pitch angle according to the invention.

Since '209 teaches:

- . neither a single screw extruder,
  - . nor a pitch angle according to the invention,
- it is respectfully requested that the rejection be withdrawn.

Case No. F3238(C)

Turning to Rauwendaal, the Office points to no disclosure of the presence of cooling means. This element is significant for the present problem (delivering an extruder apparatus which can be used to extrude ice cream), as opposed to Rauwendaal's use (plastic extrusion). It is in other respects submitted that Rauwendaal does not teach any pitch angle at all since in column 11 lines 1 to 3, it is clearly stated that any angle from -90 to -30, +30 to +90 and -30 to +30 will work as well. It is thus contended that this discloses a wide range saying that everything will work, which cannot constitute a teaching of a specific range.

So, Rauwendaal does not disclose

- . the cooling device of the invention,
- . the pitch angle of the invention.

Rauwendaal addresses a completely different problem from the one addressed by the present invention; no person skilled in the art would consider using for ice cream extrusion a technology which is directed to plastic extrusion where heating is not a problem and is in fact sought. No person skilled in the art would find in Rauwendaal the suggestion that using the specific pitch angle claimed in the instant application would bring any benefit to ice cream extrusion.

Since Rauwendaal and Hunchar refer to two incompatible technologies:

- . twin screw vs. single screw
- . ice cream (cooling) vs. plastic (heating),

Rauwendaal and Hunchar cannot be combined to serve as a basis for a 35 USC § 103 rejection.

Case No. F3238(C)

In view of the foregoing, it is respectfully requested that the application, as amended, be allowed.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings To Show Changes Made."

Respectfully submitted,



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Case No. F3238(C)

**VERSION WITH MARKINGS TO SHOW CHANGES MADE****In the specification**

The Paragraph beginning at line 7 of page 3 has been amended as follows:

An extruder screw is defined by different parameters which need accurate definitions. In order to help in the definition of such parameters, reference is made to ~~Fig. 4~~the drawing which discloses a typical screw fitted in a single screw extruder. Such an extruder is, for example, described in Engineering principles of plasticating extrusion - Zehev Tadmor - Krieger Publishing Company - 1978 - pages 39 to 45.

The Paragraph beginning at line 22 of page 3 has been amended as follows:

Thread starts: A screw can have more than one helix, in the rest of the description, each helix is called a thread start and the number of thread starts is 'n'. ~~On~~  
~~In Fig. 4~~the drawing, the screw which is represented has two thread starts.

The Paragraph beginning at line 14 of page 7 has been amended as follows:

**Detailed description of the invention****Brief Description of the Drawing**

The present invention will be further described in the following examples and by reference to the drawing wherein;

Case No. F3238(C)

~~Figure 1~~ which represents a schematic view of an extruder comprising an extruding screw.

Detailed description of the invention

In the claims:

Cancel, without prejudice, claims 1-3, 8-12 and 17-19, add new claims 20-23 and amend claims 4-7, 15 and 16 as follows:

4. (Amended) Extruder according to claim 3-20 wherein the screw comprises between 3 and 4 thread starts and the cooling liquid is ammonia.

5. (Twice amended) Extruder according to claim 4-20 with a screw LT/De ratio of between 2 and 10.

6. (Twice amended) Extruder according to claim 4-20 wherein the H/wc ratio is under 0.2.

7. (Amended) Extruder according to claim 4-20 wherein the extruder is a single screw extruder.

15. (Amended) Extruder according to claim 4-20 with a screw LT/De ratio of between 2 and 5.

16. (Amended) Extruder according to claim 8-21 wherein the H/wc ratio is over 0.1.

Case No. F3238(C)

20. (New) Single screw comprising an extruding screw and a barrel, said extruding screw having a length (LT) in contact with the barrel, a pitch length (Sp) and a screw diameter (De), said single screw extruder comprising cooling means constituted by a cooling circuit wherein a cooling liquid is circulated, said extruding screw being characterised by between 2 and 6 thread starts and pitch angle defined as  $\text{Arctg}(Sp/Pi.De)$  of between 32 and 42 degrees.

21. (New) Single screw extruder comprising an extruding screw and a barrel, said extruding screw having a length (LT) in contact with the barrel, a pitch length (Sp) and a screw diameter (De), said single screw extruder comprising cooling means constituted by a cooling circuit wherein a cooling liquid is circulated, said extruding screw being characterised by a pitch angle defined as  $\text{Arctg}(Sp/Pi.De)$  of between 32 and 42 degrees and a LT/De ratio of between 2 and 10.

22. (New) A single screw extruder comprising an extruding screw and a barrel, said extruding screw having a length (LT) in contact with the barrel, a pitch length (Sp) and a screw diameter (De), said single screw extruder comprising a cooling circuit wherein a cooling liquid is circulated, said extruding screw having between 2 and 6 thread starts and pitch angle defined as  $\text{Arctg}(Sp/Pi.De)$  of between 32 and 42 degrees.

23. (New) A single screw extruder comprising an extruding screw and a barrel, said extruding screw having a length (LT) in contact with the barrel, a pitch length (Sp) and a screw diameter (De), said single screw extruder comprising a cooling circuit wherein a cooling liquid is circulated, said extruding screw having a pitch angle defined as  $\text{Arctg}(Sp/Pi.De)$  of between 32 and 42 degrees and a LT/De ratio of between 2 and 10.



~~Fig. 1.~~

